TECHNICAL REPORT
PALEONTOLOGICAL RESOURCE ASSESSMENT
WILDFLOWER ENERGY - OTAY MESA ENERGY FACILITIES
CITY OF SAN DIEGO
SAN DIEGO, CALIFORNIA

INTRODUCTION

Wildflower Energy LP proposes to construct electric generation facilities at three sites on Otay Mesa in the southwestern portion of the City of San Diego. The proposed pump electric generation facilities include the Larkspur Energy Facility located at the intersection of Otay Mesa Road and Harvest Road, the Acacia Energy Facility located at the intersection of Otay Mesa Road and Avenida Costa Azul, and the Aster Energy Facility located at the intersection of Heritage Road and Gateway Park Drive.

This technical report provides an assessment of issues related to paleontological resources within the footprints of the proposed electric generation facilities. The purpose of this report is to assist URS staff in planning and design efforts for the proposed projects, as they relate to paleontological resource issues. Specifically, this report is intended to summarize existing paleontological resource data in the project areas and vicinity; assess potential impacts to paleontological resources from implementation of each project alternative; and identify mitigation measures to avoid or reduce project-related impacts wherever feasible. Additional discussion of report methodology is provided below. This report was prepared by Thomas A. Deméré, Ph.D., Curator of Paleontology, and Hugh M. Wagner, Ph.D., Collections Manager, San Diego Natural History Museum, San Diego, California.

As defined here, paleontological resources (i.e., fossils) are the remains and/or traces of prehistoric plant and animal life exclusive of humans. Fossil remains such as bones, teeth, shells, leaves, and wood are found in the geologic deposits (rock formations) within which they were originally buried. For the purposes of this report, paleontological resources can be thought of as including not only the actual fossil remains but also the collecting localities and the geologic formations containing those localities.

METHODOLOGY

A review was conducted of relevant published geologic reports (Kennedy and Tan, 1977), unpublished paleontological reports (Deméré and Walsh, 1993), and museum paleontological site records (Department of Paleontology, San Diego Natural History Museum). This approach was followed in recognition of the direct relationship between paleontological resources and the geologic formations within which they are entombed. Knowing the geology of a particular area and the fossil productivity of particular formations that occur in that area it is possible to predict where fossils will, or will not, be encountered. Field inspections of the project sites were conducted for this report.

EXISTING CONDITIONS

PHYSICAL GEOLOGICAL SETTING

The proposed electric generation facility sites lie within the southwestern corner of the San Diego Coastal Plain, a geomorphic region lying west of the Peninsular Ranges that is characterized by elevated Quaternary marine and fluvial terraces that have been dissected by west-flowing streams and rivers. All three proposed sites are located on the flat surface of Otay Mesa and are associated with some level of prior land use. Geologic conditions on Otay Mesa consist of a layer-cake stratigraphic sequence Cenozoic sedimentary rock units including from oldest to youngest the Oligocene-age Otay Formation, the Pliocene-age San Diego Formation, and the Pleistocene-age Lindavista Formation.

Larkspur Energy Facility

There are no outcrops of sedimentary rocks currently exposed on this grass-covered site. However, based on published records (Kennedy and Tan, 1977) the surficial geology of this site consists of modern soils developed on sandstones of the Oligocene-age Otay Formation.

Acacia Energy Facility

There are no outcrops of sedimentary rocks currently exposed on this grass-covered site. However, based on published records (Kennedy and Tan, 1977) the surficial geology of this site consists of modern soils developed on sandstones of the Pleistocene-age Lindavista Formation.

Aster Energy Facility

Prior ground disturbance of this site has produced limited exposures of pebble and cobble conglomerates. Based on published records (Kennedy and Tan, 1977) these conglomerates represent deposits of the Pleistocene-age Lindavista Formation. The San Diego Formation occurs at depth below the Lindavista Formation as exposed in nearby Spring Canyon.

PALEONTOLOGICAL RESOURCE ASSESSMENT

A description and evaluation of the paleontological resources found in each lithologic unit on the proposed energy facility sites is provided below.

Lindavista Formation

Introduction The Lindavista Formation (Kennedy, 1975) represents a marine and/or non-marine terrace deposit of early Pleistocene age (approximately 0.5-1.5 Ma). Typical exposures of the formation consist of rust-red, coarse-grained, pebbly sandstones and pebble conglomerates with locally common deposits of green claystone. The Lindavista Formation has an average thickness of about 20-30 feet and is thought to have been deposited under fluvial, aeolian, and shallow nearshore marine conditions (Kennedy, 1975). These deposits accumulated on a flat, wave-cut platform (i.e., sea floor) during a period of dropping sea levels. Today, these deposits form the extensive mesa surfaces characteristic of the Otay Mesa, San Diego Mesa, Linda Vista Mesa, Kearny Mesa, and Mira Mesa areas of the County.

Paleontology Fossil localities are rare in the Lindavista Formation and have only been recorded from a few areas (e.g., Tierrasanta and Mira Mesa). Fossils collected from these sites consist of remains of nearshore marine invertebrates including clams, scallops, snails, barnacles, and sand dollars (G. L. Kennedy, 1973), as well as sparse remains of sharks and baleen whales (E. D. Milow, pers. comm.).

Site Specific Assessment There are no records in the archives of the San Diego Natural History Museum of fossil localities occurring within the Lindavista Formation as exposed on the proposed Acacia and Aster energy facility sites. Due to the absence of any well-documented records of fossil material from the alluvial deposits in this region, these deposits are considered to have a low paleontological resource potential and following the paleontological guidelines developed by the City of San Diego (1998) these deposits are assigned a low resource sensitivity rating.

Otay Formation

Introduction The Otay Formation (Artim and Pinckney, 1973) is a fluvial sedimentary rock unit of late Oligocene age (approximately 29 Ma). The formation has been divided into three members by Walsh and Demeré (1991) who recognize a basal angular conglomerate unit, a middle gritstone unit, and an upper sandstone-mudstone unit. Typical exposures of the upper unit consist of gray-white, medium-grained, tuffaceous sandstone, with interbedded layers of brown and red-brown claystones and white waxy bentonites (Cleveland, 1960; Scheidemann and Kuper, 1979). The middle unit consists of interbedded coarse-grained sandstones and angular gravels (gritstone). The lower unit is a poorly-sorted, cobble to boulder fanglomerate (Kennedy and Tan, 1977). In general the formation becomes finer grained from bottom to top with the basal angular conglomerate unit grading upward and westward into the gritstone unit, which in turn grades upward and westward into the sandstone-mudstone unit. Taken together, the Otay Formation may be as much as 400 feet thick, but at any one location the formation is typically less than 120 feet thick.

Paleontology Numerous fossil localities have been discovered in the upper sandstone-mudstone member and the middle gritstone member. No fossils are recorded from the angular conglomerate member. Prior to residential and commercial development in the EastLake area, the Otay Formation was not known to be fossiliferous. Fossils from the

formation discovered during this development include well-preserved remains of a diverse assemblage of terrestrial vertebrates such as tortoise, lizards, snake, birds, shrews, rodents, rabbit, dog, fox, rhinoceros, camels, mouse-deer, and oreodonts (Deméré, 1988). Based on these recent discoveries the Otay Formation is now considered to be the richest source of late Oligocene terrestrial vertebrates in California.

Site Specific Assessment There are no records in the archives of the San Diego Natural History Museum of fossil localities occurring within the Otay Formation as exposed on the Larkspur Energy Facility site. However, a number of fossil localities are recorded in this geologic deposit as exposed to the north of the project area. Due to the recovery of large and diverse fossil assemblages from these localities, the Otay Formation is considered to have a high paleontological resource potential and following the paleontological guidelines developed by the City of San Diego (1998) these deposits are assigned a high resource sensitivity rating.

IMPACT ANALYSIS

INTRODUCTION

Direct impacts to paleontological resources occur when earth work activities, such as pipeline trenching operations, cut into the geological deposits (formations) within which fossils are buried. These direct impacts are in the form of physical destruction of fossil remains. Since fossils are the remains of prehistoric animal and plant life they are considered to be nonrenewable. Such impacts can be significant and, under CEQA guidelines, require mitigation.

Impacts to paleontological resources are rated in this report from high to low depending upon the resource sensitivity of impacted formations. The specific criteria applied for each sensitivity category are summarized below.

High significance
Impacts to high sensitivity formations (Otay Formation).

Moderate significance
Impacts to moderate sensitivity formations.

Low significance
Impacts to low sensitivity formations (Lindavista Formation).

SITE SPECIFIC IMPACTS

Larkspur Energy Facility
Without reviewing site-specific excavation plans and geotechnical studies of subsurface conditions it is not possible to completely assess the nature of projects impacts on paleontological resources. However, it is assumed that site development will involve only

shallow excavations for foundations and utility lines. This minor amount of ground disturbance will probably be confined to the modern soil horizon, but may extend into weathered bedrock of the Otay Formation. Because of the destructive nature of surface weathering on fossils, it is suggested that even if bedrock deposits are encountered during site grading there will not likely be any fossil remains still preserved in these deposits. Therefore, development of the site likely will not result in a significant impact to paleontological resources.

Acacia Energy Facility
Without reviewing site-specific excavation plans and geotechnical studies of subsurface conditions it is not possible to completely assess the nature of projects impacts on paleontological resources. However, it is assumed that site development will involve only shallow excavations for foundations and utility lines. This minor amount of ground disturbance will probably be confined to the modern soil horizon, but may extend into weathered bedrock of the Lindavista Formation. Because of the low paleontological sensitivity of the Lindavista Formation, any possible impacts to it are not considered significant.

Aster Energy Facility
This site has been previously sheet graded and exposes coarse conglomerates of the Lindavista Formation. Because of the low paleontological sensitivity of the Lindavista Formation, any possible impacts to it are not considered significant.

MITIGATION MEASURES

Larkspur Energy Facility
Because development of this site will not produce direct impacts to high sensitivity paleontological resources there is no need for impact mitigation.

Acacia Energy Facility
Because development of this site will not produce direct impacts to high sensitivity paleontological resources there is no need for impact mitigation.

Aster Energy Facility
Because development of this site will not produce direct impacts to high sensitivity paleontological resources there is no need for impact mitigation.

REFERENCES CITED

Artim, E.R., and C.J. Pinckney. 1973. La Nacion fault system, San Diego, California. Geological Society of America, Bulletin 84:1075-1080.

City of San Diego. 1998 (revised). Paleontological Guidelines.

Cleveland, G.B. 1960. Geology of the Otay bentonite deposit, San Diego County California. California Division of Mines, Special Report 64:1-16.

Deméré, T.A. 1988. Early Arikareean (late Oligocene) vertebrate fossils and biostratigraphic correlations of the Otay Formation at EastLake, San Diego County, California. In, M.V. Filewicz and R.L. Squires (eds.), Paleogene Stratigraphy, West Coast of North America. Society of Economic Paleontologists and Mineralogists, Pacific Section 58:35-43.

Deméré, T. A., and S. L. Walsh. 1993. Paleontological Resources, County of San Diego. Prepared for the Department of Public Works, County of San Diego, 1-68.

Hertlein, L. G., and U. S. Grant, IV. 1939. Geology and oil possibilities of southwestern San Diego County, California. California Journal of Mines and Geology, vol. 35: 57-78.

Kennedy, G.L. 1973. Early Pleistocene invertebrate faunule from the Lindavista Formation, San Diego, California. San Diego Society of Natural History, transactions 17:119-128.

Kennedy, M.P. 1975. Geology of the San Diego metropolitan area, California. Section A - Western San Diego metropolitan area. California Division of Mines and Geology, Bulletin 200:9-39.

Kennedy, M. P., and S. S. Tan. 1977. Geology of National City, Imperial Beach, and Otay Mesa quadrangles, southern San Diego Metropolitan area, California. California Division of Mines and Geology, Map Sheet 29.

Scheidemann, R.C., Jr., and H.T. Kuper. 1979. Stratigraphy and lithofacies of the Sweetwater and Rosarito Beach formations, southwestern San Diego County, California and northwestern Baja California, Mexico. In, C.J. Stuart (ed.), A Guidebook to Miocene Lithofacies and Depositional Environments, Coastal Southern California and Northwestern Baja California. Society of Economic Paleontologists and Mineralogists, Pacific Section, pp. 107-118.

Walsh, S.L., and T.A. Deméré. 1991. Age and stratigraphy of the Sweetwater and Otay Formations, San Diego County, California. In, P.L. Abbott and J.A. May (eds.), Eocene Geologic History San Diego Region. Society of Economic Mineralogists and Paleontologists, Pacific Section 68:131-148.